United States Department Of Agriculture | Forest Service | Shasta-Trinity National Forest
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Subject: Evaluation of red fir mortality on Hull Mountain, Upper Lake RD, Mendocino NF (Report No. N89-20)

To: Forest Supervisor, Mendocino NF

Craig Edberg, Culturist on the Upper Lake RD, requested an evaluation of recent red fir mortality on Hull Mountain. Craig assisted Dave Schultz and Gregg DeNitto from the Forest Pest Management Northern Service Area in evaluating the area.

Stands on top of Hull Mountain are composed largely of red fir, with a smaller component of white fir and occasional individuals of other species such as western white pine. Large areas along the crest support no trees or only widely scattered trees with barren ground between the trees. Some areas just off the crest support aggregations of old growth timber or are densely stocked with young growth red fir.

Fir trees were dying in all situations examined. The fir engraver, Scolytus ventralis, was present in most of the dead trees and the fir flatheaded borer, Melanophila drummondi, was present in the thicker barked portion of some trees. The primary reason for the high level of mortality is a combination of site or stand conditions and several years of below normal precipitation. Studies have shown that some barren areas in red fir stands support very little vegetation because low soil pH limits the availability of nutrients. This may be the cause of some of the areas on Hull Mountain which support only sparse grass and forbs.

An extremely rocky, shallow soil appears to be a major factor for the very sparse nature of some stands. The trees growing in these areas showed signs of slow growth, and many trees had previously experienced topkill and branch dieback. Some of the recently killed trees were at least 40 feet from the nearest tree, so competition does not appear to be a major factor causing mortality in the sparsely vegetated areas. The most likely reason for mortality in these areas is the severe stress produced by several years of below normal precipitation on a site with low water holding capacity, which enabled the fir engraver to successfully attack these trees. Because normal climatic fluctuations are likely to make growing conditions severe in certain areas on Hull Mountain for part of each rotation, these areas do not appear capable of producing commercial timber on a sustained basis.

Soils on some parts of Hull Mountain are capable of supporting trees under most circumstances. Dense stands of red fir have developed in stringers or pockets near the crest where conditions were suitable. These trees had good form and appeared to be growing fairly well until recently. A combination of low precipitation and dense stocking made some fir trees susceptible to attack by the fir engraver. Because the mortality has occurred as groups of trees, there

are now some small areas with few live trees while nearby areas are still densely stocked. Because rotations tend to be quite long in red fir, there will probably be at least one more period of dry weather before these stands are mature. The densely stocked aggregations would probably reach commercial size more rapidly, and experience less mortality, if they were thinned.

There would be an advantage to waiting for at least a year after precipitation returns to normal before undertaking any activities in these stands. Trees which have been attacked by the fir engraver are often difficult to detect until the crown begins to fade. It is quite likely that some additional trees have been attacked by the fir engraver and will fade during the spring of 1990. Fir engraver attacks will subside as the trees regain their vigor with the return of normal precipitation.

Management Alternatives

1. Do nothing. Tree mortality caused by the fir engraver will continue at about the same rate until one year after precipitation returns to normal, and then subside. Additional mortality will occur during periods of low precipitation. Areas with suitable soil conditions will eventually produce enough volume for a commercial harvest, although the length of the rotation will be long, and the yield will be less than what could be produced under stocking control. A few additional trees will seed into the sparsely vegetated rocky areas, but additional trees will die during future drought periods. The rocky areas will probably never have many more trees than are currently present and few of them will achieve commercial size. The grassy balds and barren areas will remain unchanged.

2. Salvage dead trees. This would recover some wood that would otherwise deteriorate fairly quickly. It would have little or no effect on future mortality. Some soil scarification during salvage harvest activities may result in an increase in natural regeneration, but generally the stands will perform similarly to the Do nothing alternative.

3. Thin stands. Prior to the recent mortality, some of the red fir stands were densely stocked. Some of these areas would still benefit from thinning, although it would be best to wait for at least a year before taking action. There are some fir trees in the area which have been attacked by the fir engraver, but will not fade until the spring of 1990. Because the attacked trees will be difficult to identify until they begin to fade, some leave trees designated prior to the spring of 1990 may not survive. Windthrow has not been a significant problem in these stands up to this point. Thinning the stands could expose the residual trees and increase the likelihood of windthrow. A compromise between the desired stocking level that will reduce mortality and an adequate level that provides stand support may need to be accepted. Leave trees should be those in the dominant and codominant crown classes. Thinning is not likely to have any effect on mortality in areas where the trees are already sparsely stocked because of thin, rocky soil.

If you have questions about this evaluation or would like to discuss the alternatives, please call Dave Schultz or Gregg DeNitto at (916) 246-5087.

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